

REMARKS

Claims 14, 15 and 19 have been canceled, and new claims 20-30 have been added.

No new matter was added. Thus, claims 13, 16-18 and 20-30 are pending in this application.

Applicant presents arguments herein in response to the Examiner's rejections and respectfully submits that the present application fully complies with 35 USC §112, first paragraph, and that the pending claims are patentable over the prior art relied on by the Examiner.

Accordingly, allowance of the present application is respectfully requested.

I. Claim Rejections under 35 USC §112, First Paragraph

The Examiner rejected claims 13-19 under 35 USC §112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The Examiner also rejects claims 13-19 under 35 USC §112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor, at the time the application was filed, had possession of the claimed invention.

More specifically, the Examiner states on page two of the Office Action that:

“... One of ordinary skill in the art of controlling mites would not be able to control, as the parameters for identification of control are not provided. Identification of HDM driven out by heat does not constitute elimination of HDM by chemical anti-fungal incorporated into a fiber — it is not possible to identify, then, what is intended as ‘control’ since all fibers tested (Table 2) had HDM. Further, very little limited anti-fungal agents are disclosed, absent showing of efficacy and definition of control, the only compounds experimentally used is triclosan. Tolnaftate was not shown as a manufactured product (bedding) effective to “control” HDM — it was shown to what it is already known to do — reduce *A. re pens* growth. Further, an area of concern exists as to the amount and concentration of toxic materials, the unspecified as claimed antifungals, incorporated into man or animal contact materials.”

In addition, the Examiner states on page five of the Office Action that:

“... The proliferation is not evident to examiner in the specification. Applicant’s citation is to effects after formation of the treated fibres and articles, not in the process as claimed. The only pretreatment is active addition of 50 HDM as an experimental test (page 6).”

As described in detail on page 1 of the present application, as filed, house dust mites and bedmites (HDM) typically thrive and proliferate (ie. grow by rapid production of new offspring) in bedding, upholstered articles and fibrous floor coverings due to the ample food supply of dead skin fragments (dander) that is continually shed by humans and/or pets on such articles. The excretions of the HDM provide a major source of allergies and aggravate the conditions of asthma sufferers. Thus, the present invention seeks to manufacture bedding, upholstered articles and fibrous floor coverings that, in use, provide an environment in which HDM cannot thrive and proliferate. This results in improved living conditions for allergy and asthma sufferers.

As described in detail on page 2 of the present application, as filed, dead skin fragments, as shed, have a very low moisture content and a high fat content. As such, they are a poor food source for HDM in their as shed condition. However, certain microscopic fungi grow on the dead skin fragments, absorb moisture from the atmosphere, and raise the moisture content of the dead skin fragments. In addition, the fungi reduce the fat content of the dead skin fragments and are responsible for generating B-group vitamins and ergosterol. Thus, the dead skin fragments, as modified by particular fungi, become a suitable food source for HDM.

The present invention provides a method of controlling the proliferation of HDM in bedding, upholstered articles and fibrous floor coverings by incorporating a fungicidal compound into a manmade fiber during the course of its manufacture. The compound is

located within the structure of the fiber and has anti-fungal activity against fungi of at least one of the groups *aspergillus glaucus* and *aspergillus restrictus*. The fiber is utilized to manufacture the bedding, upholstered articles and fibrous floor coverings.

The fungicidal compound does not kill HDM. Rather, it kills the fungi which are responsible for converting dead skin fragments into a suitable HDM food source. Thus, by eliminating a major HDM food source, the articles manufactured according to the present invention "control" HDM by essentially starving any HDM that attempt to colonize the articles thereby creating an environment unsuitable for HDM proliferation.

Page 4, lines 16-21, of the present application as filed provides a list of suitable compounds, which include: tolnaftate, bifonazole, clotrimazole, miconazole, dichlorophene, hexachlorophene and triclosan. (See new claim 29). Page 4, lines 22-24, of the present application as filed provides a specific range of the amount of compound by weight percent of the fiber. The cited range is 0.01 to 2 percent by weight of the fiber. (See new claim 30).

Other advantages of the present invention are discussed on page 4, lines 28-36. Since the compound is incorporated into the fiber during the course of manufacturing the fiber, the compound is located within the structure of the fiber. Thereafter, it diffuses to the surface of the fiber only when the compound is depleted from the surface, such as, due to laundering or dry-cleaning. Thus, release of the compound into the environment is minimized (as compared to topical applications of fungicide disclosed on page 2, lines 23-29, of the present application) and the anti-fungal effect is long-lasting and endures throughout laundering and dry-cleaning.

Pages 5-7 of the present application disclose some specific examples of the present invention. Table 2 shows the results of a test performed on a control fabric (COURTELLE fabric) and on fabrics according to the present application that include: AMICOR AF fabric

(containing 0.4% tolnaftate), AMICOR AB fabric (containing triclosan), and a 50/50 AMICOR AF/AMICOR AB fabric blend.

The test used in the example was based on a forthcoming European Standard Test promulgated by the French testing authority BNITH. Fifty HDM were intentionally placed on each of the fabric samples, and each sample was cultured for eight weeks at room temperature and 75% relative humidity. The natural lifespan of HDM is 8 to 10 weeks; thus, the test is utilized to determine whether or not offspring are being produced at the later stages of the lifespan of the original 50 HDM. HDM emigrating from a barren environment or leaving to colonize other areas are captured on a tape and counted at the end of the eight week test. Heat is used to drive the live HDM from the fabrics at the end of the eight week test only so that they can be counted. The number of HDM on the tape and driven out by the heat are totaled.

The tests revealed that the total number of HDM in the control fabric increased from 50 to 78. This indicates a thriving HDM community that is producing offspring and increasing in numbers. In contrast, the total number of HDM in the fabrics according to the present invention all decreased to numbers below 50. This indicates that the HDM are dying at the end of their natural lifespan without reproducing. Thus, the fabrics according to the present invention do not provide an environment in which the HDM can thrive and proliferate. Therefore, Applicant submits that the figures quoted in Table 2 make it clear to persons skilled in the art that the control of HDM is achieved by use of fabrics made according to the present invention.

Applicant respectfully submits that the present application, as filed, provides an enabling disclosure and conveys to those of skill in the art that the inventor had possession of the claimed invention at the time the application was filed. The application discloses specific

compounds (see page 4, lines 16-21), specific manmade fibers (see page 3, lines 9-20, and page 4, line 32), and a specific method for incorporating the compound into the fiber (see page 5, line 10-12). The application discloses the use of the fiber for making bedding, upholstered articles and fibrous floor coverings (see page 3, lines 21-23). The application also discloses to one having skill in the art the theory behind the invention. To this end, in use, the articles resist HDM proliferation because they prevent dead skin fragments from being converted to a suitable HDM food source. This is accomplished by killing certain groups of fungi (ie. aspergillus glaucus and aspergillus restrictus). Further, Applicant provides an Example section in the application, as filed, which reveals that when 50 HDM are intentionally placed within an article according to the present invention, the HDM do not produce offspring and their numbers decrease. Thus, Applicant had possession of the claimed invention at the time of filing, and the application as filed enables the claimed invention.

Therefore, Applicant respectfully requests reconsideration and removal of both of the cited 35 USC §112, first paragraph, rejections.

II. Claim Rejections under 35 USC §102(b) - Kluft

In the Office Action, the Examiner rejected claims 13-19 as being anticipated under 35 USC §102(b) in view of International PCT Publication No. WO 97/24484 of Kluft.

The Kluft publication is prior art effective as of its publication date, which is July 10, 1997. The present application is the U.S. national phase of International PCT Application No. PCT/GB98/03137, which claims the benefit of priority of GB 9722448.9 filed on October 23, 1997. Thus, the effective filing date of the present application is **October 23, 1997** which is within a year of the publication date, **July 10, 1997**, of the Kluft reference. Thus,

Applicant submits that the Kluft reference cannot be properly cited under 35 USC §102(b) as a basis of rejection for the claims of the present application. Therefore, removal of the §102(b) rejection is respectfully requested.

The Applicant also submits that, even if the reference can be properly cited against the claims of the present application (ie. under 35 USC §102(a)), the claims of the present application are patentable over the disclosure of the Kluft reference.

On page 2, lines 16-28, the Kluft reference discusses the disadvantages of prior art bedding articles that are treated with topical applications of biocides and/or fungicides. Also, see the present application on page 1, line 33, to page 2, line 5, and on page 2, lines 23-29, for disclosures of prior art topical applications of acaricides (the generic name for substances that are lethal to mites) and fungicides on bedding articles. Such treatments are limited to use, if at all, in hospital or institutional environments, because of the practical difficulties of repeatedly treating bedding with such compounds subsequent to laundering. Thus, the Kluft reference and the present application share a similar goal of providing a launderable product that does not require repeat treatments of a bedding article with an acaricide or fungicide after laundering.

Kluft uses a biocide, specifically an acaricide, to kill HDM directly. Although a fungicide is also disclosed for use in combination with the biocide, use of fungicides that specifically control fungi of the groups *A.glaucus* and *A.restrictus* are not disclosed.

In order to produce a launderable article, Kluft mixes the biocide and fungicide with a bonding agent (“liant”) and sprays the mixture onto the outer surface of synthetic, wool or cotton fibers. To this end, after loose fibers are dyed, the fibers are sprayed and coated with the biocide/fungicide/bonding agent mixture. The bonding agent is a melamine-formaldehyde resin or a fluorinated acrylic compound, which are well known as finishing

agents applied to fibers to provide an easy-care finish or waterproof finish. Thus, Kluft encases the biocide/fungicide within a resinous coating applied to the outer layer of synthetic, wool or cotton fibers and discloses that the biocide/fungicide on such fibers survive launderings.

The independent claims, 13 and 21, of the present application require a method for controlling house dust mites and bedmites and a method for manufacturing an article that is resistant to the proliferation of house dust mites and bedmites. A compound is incorporated into a manmade fiber during the course of manufacturing the manmade fiber. For example, the compound can be added to the spinning dope during manufacture of the fiber. (See GB 2309461). Thus, the compound is located within the fissured structure of the manmade fiber (see the present application on page 4, lines 32-36). The compound is specifically required to provide anti-fungal activity against fungi of at least one of the groups *aspergillus glaucus* and *aspergillus restrictus*. The manmade fiber containing the compound is used to manufacture articles in which HDM are traditionally known to proliferate, such as bedding, upholstered articles and floor coverings.

The fissured structure of the manmade fiber made in accordance to the present invention permits diffusion of the compound to a surface of the manmade fiber upon depletion of the compound therefrom to provide the article with a long-lasting antifungal effect that endures through successive laundering cycles. (See the present application on page 4, lines 32-36.) Thus, fungicide lost from the surface of the fibers during laundering of the articles is replenished in a controlled manner as fungicide migrates to the outer surface of the fibers from within the fissures of the fibers. The manufactured articles provide antifungal activity against fungi of at least one of the groups *aspergillus glaucus* and *aspergillus*

restrictus and are thereby resistant to the proliferation of house dust mites and bedmites since a nourishing environment for the HDM is not provided.

The Kluft reference does not anticipate independent claims 13 and 21. To this end, Kluft uses a biocide to directly kill HDM. Kluft does not disclose the use of a fungicide specifically capable of killing fungi of at least one of the groups *aspergillus glaucus* and *aspergillus restrictus*, and does not disclose a method which eliminates a HDM food source by preventing the conversion of dead skin fragments from being converted into a food source suitable for HDM.

Further, Kluft applies a coating of a biocide, fungicide and bonding agent mixture to the outer surfaces of pre-existing fibers such that the biocide and fungicide are encased within an outer resinous layer. The application of a coating to the fibers complicates the production process of the fibers and spoils the aesthetic characteristics of the natural surfaces of the fibers thereby providing a deleterious effect on the processability of the fibers and on their flexibility and handle, qualities which are of particular importance in the field of bedding. While Kluft may accomplish the goal of providing a launderable product, this may only be because the enveloped biocide/fungicide is not readily available in the first place.

Kluft clearly does not disclose incorporating the biocide/fungicide mixture within the structure of fibers during the manufacture of the fibers such that the compound is incorporated into fissures within the manmade fiber. Kluft also fails to disclose the use of a fungicide that provides anti-fungal activity specifically against fungi of at least one of the groups *aspergillus glaucus* and *aspergillus restrictus* and fails to disclose the formation of a fiber/fungicide structure in which fungicide can migrate to the surface of the fibers to replenish fungicide lost as a result of laundering. Further, the method according to the present invention provides a simplified production process that does not require a coating step

and that does not spoil the aesthetic characteristics provided by the natural surface of the fibers.

Finally, the Kluft reference does not disclose acrylic fibers. Rather, Kluft only discloses the use of acrylic materials with respect to a bonding agent ("liant").

Applicant respectfully submits that, for any of the above stated reasons, the Kluft reference does not anticipate the independent claims of the present application.

Reconsideration and removal of the rejection of claims 13 and 16-18 is therefore requested.

III. Claim Rejections under 35 USC §102(b) - Cox et al.

In the Office Action, the Examiner rejects claims 13-17 as being anticipated under 35 USC §102(b) in view of published UK Patent Application GB 2309461 of Cox et al.

GB '461 is prior art effective as of its publication date, which is July 30, 1997. The present application is the U.S. national phase of International PCT Application No. PCT/GB98/03137, which claims the benefit of priority of GB 9722448.9 filed on October 23, 1997. Thus, the effective filing date of the present application is **October 23, 1997** which is within a year of the publication date, **July 30, 1997**, of GB '461. Thus, Applicant submits that the GB '461 reference cannot be properly cited under 35 USC §102(b) as a basis of rejection for the claims of the present application. Therefore, removal of the §102(b) rejection is respectfully requested.

The Applicant also submits that, even if the reference can be properly cited against the claims of the present application (ie. under 35 USC §102(a)), the claims of the present application are patentable over the disclosure of the GB '461 reference.

The inventor of the present application, Roland Cox, is the lead inventor of GB '461. GB '461 discloses fungicidal acrylic fibers produced by incorporating a fungicide into the

fiber during the course of manufacturing the fiber. More specifically, the fungicide is incorporated into a spinning dope used to make a wet-spun acrylic fiber. The disclosed fibers were specifically developed and commercialized under the trademark "AMICOR" for use in making yarn for socks. GB '461 also discloses use of the fibers in connection with athletic apparel, awnings and tents where sweat and/or rain can lead to fungal growth and odor problems.

The GB '461 reference does not disclose the manufacture of bedding, upholstered articles and floor coverings. This is because such domestic articles are typically not subjected to great amounts of sweat and rain that would cause odor problems. The GB '461 reference also does not disclose anything with respect to controlling house dust mites or bedmites and does not disclose the specific requirement for controlling fungi of at least one of the groups *aspergillus glaucus* and *aspergillus restrictus* to prevent dead skin fragments from being converted into a suitable HDM food source.

The inventors of the GB '461 reference did not contemplate using fungicidal acrylic fibers for uses where HDM proliferate, and one of ordinary skill in the art would have no reason to believe that such fibers would be effective in controlling HDM. For instance, the GB '461 reference discloses an example in which the fungicidal fibers are tested for their effectiveness on *Aspergillus niger* fungus. (See pages 5 and 6 of the GB '461 reference.) However, *Aspergillus niger* fungus is not known to aid in the nourishment of HDM; rather, it is known to have "an unfavourable influence on mites". (See column 3, lines 19-25, of U.S. Patent No. 4,442,091 issued Lebrun et al., which is cited by the Examiner.) Thus, one of skill in the art is provided with no suggestion or motivation for utilizing fungicidal acrylic fibers in a method for preventing HDM proliferation.

Applicant respectfully submits that, for any of the above stated reasons, the GB '461 reference does not anticipate the independent claims of the present application.

Reconsideration and removal of the rejection of claims 13, 16 and 17 is therefore requested.

IV. Claim Rejections under 35 USC §103(a) - Kluft/Lebrun

In the Office Action, the Examiner rejects claims 13-19 as being obvious under 35 USC §103(a) over International PCT Publication No. WO 97/24484 of Kluft in view of U.S. Patent No. 4,442,091 issued Lebrun et al.

The Kluft reference and its significant differences from the present invention are discussed above in detail.

The Lebrun patent discloses topical applications of a fungicide (natamycin) to bedding by spraying the fungicide on the exposed surfaces of the bedding after each laundering. Such treatments are limited to use, if at all, in hospital or institutional environments, because of the practical difficulties of repeatedly treating bedding with such a compound subsequent to laundering. Extreme circumstances might justify the use of such a method; however, it is not practical for domestic use and fails to address how the practical problems caused by its disclosed methodology could be overcome.

Both the Kluft reference and the present application discuss the disadvantages of prior art bedding articles that are treated with topical applications of biocides and/or fungicides. For instance, see the present application on page 1, line 33, to page 2, line 5, and on page 2, lines 23-29, for disclosures of prior art topical applications of acaricides (the generic name for substances that are lethal to mites) and fungicides on bedding articles.

Thus, the combination of the Kluft reference with the teachings of the Lebrun patent does not disclose, teach or suggest the methods claimed in independent claims 13 and 21 of

the present application for the same reasons discussed previously with respect to the rejection solely on the Kluft reference. To this end, neither Kluft nor Lebrun discloses a method that incorporates a fungicide within the structure of a manmade fiber during manufacture of the fiber such that the compound is incorporated into fissures within the manmade fiber. In addition, neither Kluft nor Lebrun discloses a method for the formation of a fungicidal fiber structure in which fungicide can migrate from within the structure of the fiber to the surface of the fiber to replenish fungicide lost, for instance, as a result of laundering. Still further, neither reference discloses a method that does not require a coating step and that does not spoil the aesthetic characteristics provided by the natural surface of the fiber.

For these reasons, Applicant respectfully submits that the independent claims, 13 and 21, of the present application are patentable over the Kluft reference and Lebrun patent combination.

Reconsideration and removal of the rejection of claims 13, 16-18 is therefore requested.

V. Conclusion

Applicant has made a significant advance in the development of bedding and like domestic articles that are capable of providing improved conditions for allergy and asthma sufferers by preventing the colonization and proliferation of HDM therein. His invention is meritorious.

In view of the above amendments and remarks, Applicant respectfully submits that the rejections have been overcome and that the present application is in condition for allowance. Thus, a favorable action on the merits is therefore requested.

Please charge any deficiency or credit any overpayment for entering this Amendment
to our deposit account no. 08-3040.

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